

REMARKS

This is intended as a full and complete response to the Office Action dated September 23, 2008, having a shortened statutory period for response set to expire on December 23, 2008. In view of the following amendment and discussion, the Applicants believe all claims are in allowable form.

CLAIM REJECTIONS

A. 35 U.S.C. §103 Claims 1-5, 7 and 9-13

Claims 1-5, 7 and 9-13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over United States Patent Publication No. 2001/0034140 published October 25, 2001 to *Shioya, et al.* (hereinafter referred to as "*Shioya*") in view of United States Patent No. 6,211,096 issued April 3, 2001 to *Allman, et al.* (hereinafter referred to as "*Allman*"). The Applicants respectfully disagree.

Independent claims 1 and 7 recite elements not taught or suggested by the combination of *Shioya* and *Allman*. *Shioya* teaches a method for depositing a silicon carbon film. *Allman* teaches using TEOS precursor along with N₂O and O₂ gas to deposit a dielectric film. However, neither *Shioya* nor *Allman*, alone or in combination, teaches or suggests controlling a carbon content of the low dielectric constant film at between about 5 and about 30 atomic percent, as recited by claims 1 and 7. The Examiner asserts that *Allman* would have inherently had a carbon content within the claimed range since the carbon content depends on the selected percentage, and the selected percentage disclosed by *Allman* is within the claimed range for the ratio of N₂O gas to the total oxidizing gas. The Examiner further asserts that it would have been obvious to one of ordinary skill to adjust the selected percentage of N₂O and O₂ through routine experimentation to achieve desired carbon content. The Applicants respectfully disagree.

As admitted by the Examiner, *Allman* teaches using a TEOS precursor along with N₂O and O₂ gas to deposit a dielectric film. *Allman* recognizes that amount of oxygen and nitrogen atoms present in the resultant dielectric film may be controlled by adjusting N₂O and O₂ gas ratio. However, *Allman* does not discuss the carbon content of the

resultant film, and as such, provides no insight as to how the carbon content of a deposited film may be controlled.

Furthermore, *Allman* teaches using a gas mixture that includes N_2O , O_2 and TEOS as a precursor. Thus, the gas mixture will contain carbon, silicon, oxygen, hydrogen atoms. Accordingly, the resultant film will include carbon, silicon, oxygen, nitrogen and hydrogen atoms. *Allman* teaches that adjusting the N_2O and O_2 gas ratio would affect the amount of nitrogen and oxygen atoms present in the resultant film. However, the amount of carbon, silicon and hydrogen atoms, along with their inter-related ratios, present in the resultant film is never discussed by *Allman*, nor does *Allman* teach how much of these atoms are desirable or how to control the amount of these atoms in the resultant film.

Following the roadmap set by the Examiner, the resultant film only provides for control of the amount of the oxygen and nitrogen atoms formed in the resultant film. No other elements/atoms are discussed nor is a hint of what quantity of the other elements/atoms to be expected provided. Adjusting ratio of N_2O and O_2 does not necessarily result in change of the ratio of carbon atoms in the resultant film, as the resultant film may contain more types of atoms (e.g., at least more than 5 types, such as carbon, silicon, oxygen, nitrogen and hydrogen atoms discussed above), instead of only nitrogen, oxygen and carbon atoms. Accordingly, the Applicants respectfully submit that rejection uses impermissible hindsight in light of the disclosure in Applicants' patent application to provide a particular ratio of carbon atoms in the resultant film.

The Examiner takes the position that by adjusting of N_2O and O_2 , as taught by *Allman*, the carbon atom ratio of the resultant film would definitely be controlled. However, the Examiner proposition is not always true, as the precursors used in the gas mixtures have more than three types of atoms involved. Therefore, simply adjusting the ratio of N_2O and O_2 supplied in the gas mixture does not automatically mean the carbon ratio formed in the resultant film will be changed or otherwise controlled.

Similar to the discussion above, as adjusting N_2O and O_2 gas of *Allman* would not result in controlling a carbon content of the low dielectric constant film at between about 5 and about 30 atomic percent as claimed in the present application, there is no reasonable expectation of success that the resultant film would have similar film

properties when the main precursor (e.g., TEOS) has been switched to a different precursor. Specifically, switching of precursors may result in complex and different process mechanisms that have even more types of atoms involved during the reaction. The inherent unpredictability of the process reaction when the main precursor is substituted would not provide reasonable expectation of success that the resultant film would have a carbon content of the low dielectric constant film at between about 5 and about 30 atomic percent, as claimed in the present application.

Furthermore, neither *Shioya* nor *Allman*, teaches or specifies what range of carbon content in the resultant film is desired. Additionally, there is no teaching or suggestion from *Allman* that would suggest one of ordinary skill in the art to modify its main precursor, TEOS, to the precursor as taught by *Shioya*, as asserted by the Examiner, to form the low dielectric constant film at a certain desired carbon content range.

The Applicants respectfully submit that to establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. (See, MPEP 2163.07(a)). Accordingly, since neither *Shioya* nor *Allman* specifies what range of carbon content in the resultant film is desired, there are no teachings in the references that would suggest one of ordinary skill in the art to yield controlling a carbon content of the low dielectric constant film at between about 5 and about 30 atomic percent, as claimed in the present application, and the Examiner's assertion of inherency is not established as the missing element, carbon content of between about 5 and about 30 atomic percent, at it is never discussed or taught by either of the references. As such, a *prima facie* case of obviousness has not been established as the references fail to teach each claimed element.

Thus, Applicants submit that independent claims 1 and 7 and all claims depending therefrom are patentable over *Shioya* in view of *Allman*. Accordingly, the Applicants respectfully request the rejection be withdrawn.

B. 35 U.S.C. §103 Claims 6 and 14

Claims 6 and 14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Shioya* in view of *Allman* and further in view of United States Patent No. 6,582,777 issued June 24, 2003 to *Ross, et al.* (hereinafter referred to as "*Ross*"). The Applicants respectfully disagree.

Independent claims 1 and 7, from which claims 6 and 14 depend, recites elements not taught or suggested by the combination of *Shioya*, *Allman* and *Ross*. The patentability of claim 1 over *Shioya* and *Allman* has been discussed above. *Ross* is cited for exposing a chemical vapor deposited dielectric layer to electron beam radiation for a sufficient time. *Ross* does not teach or suggest delivering a gas mixture comprising two or more oxidizing gases comprising N_2O and O_2 to a substrate in a chamber, wherein a ratio of a flow rate of the N_2O to a total flow rate of the two or more oxidizing gases into the chamber is between about 0.1 and about 0.5 and controlling a carbon content of the low dielectric constant film at between about 5 and about 30 atomic percent, as recited by claims 1 and 7. Therefore, there is no teaching or suggestion from *Ross* that would suggest with a reasonable expectation of success to one of ordinary skill in the art to modify the teaching of *Allman* and *Shioya* in a manner that would yield delivering a gas mixture comprising two or more oxidizing gases comprising N_2O and O_2 to a substrate in a chamber, wherein a ratio of a flow rate of the N_2O to a total flow rate of the two or more oxidizing gases into the chamber is between about 0.1 and about 0.5 to deposit a low dielectric constant film, and controlling a carbon content of the low dielectric constant film at between about 5 and about 30 atomic percent, as recited by claims 1 and 7. As such, a *prima facie* case of obviousness has not been established as the references fail to teach each claimed element.

Thus, Applicants submit that claims 6 and 14, which depend from claims 1 and 7 respectively, are patentable over *Shioya* in view of *Allman*, and further in view of *Ross*. Accordingly, the Applicants respectfully request the rejection be withdrawn.

DOUBLE PATENTING

Claims 1-5 stand rejected under obviousness-type double patenting as being unpatentable over claims 1, 9 and 13-14 of United States Patent No. 6,797,643 in view of *Allman*. Claim 6 stands rejected under obviousness-type double patenting as being unpatentable over claim 1 of United States Patent No. 6,797,643 in view of *Allman* and in view of *Ross*. Claims 7 and 9-13 stand rejected under obviousness-type double patenting as being unpatentable over claims 1, 9 and 13-14 of United States Patent No. 6,797,643 in view of *Allman* and further in view of *Li*. Claim 14 stands rejected under the obviousness-type double patenting as being unpatentable over claim 1 of United States Patent No. 6,797,643 and in view of *Allman* and *Li* and further in view of *Ross*. Claims 7 and 9-13 stand rejected under obviousness-type double patenting as being unpatentable over claims 1, 9 and 13-14 of United States Patent No. 6,797,643 in view of *Allman* and further in view of *Shioya*. Claim 14 stands rejected under obviousness-type double patenting as being unpatentable over claim 1 of United States Patent No. 6,797,643 in view of *Allman* and *Shioya*. In response, the Applicants agree to file a Terminal Disclaimer under 37 C.F.R. §1.130(b) to obviate the rejection once the rejections to the claims under 35 U.S.C. §§102, 103 and 112 have been withdrawn.

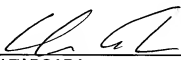
CONCLUSION

Thus, for at least the reasons discussed above, Applicants submit that all claims are in condition for allowance. Accordingly, the Applicants respectfully request reconsideration of this application and its early allowance.

If the Examiner believes that any unresolved issues still exist, it is requested that the Examiner telephone Mr. Keith Taboada at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

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